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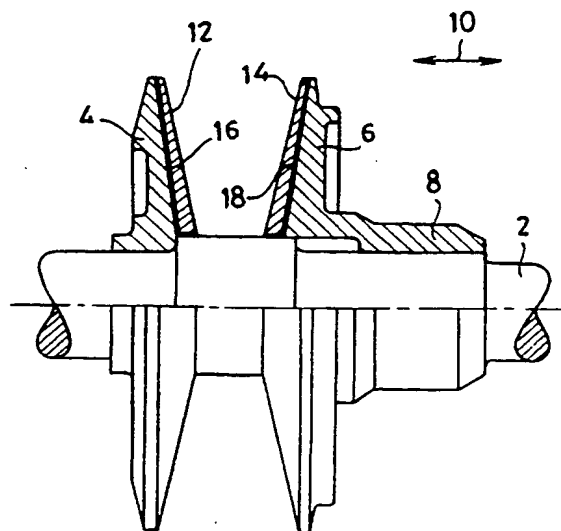
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**NL-2509 LP 's-Gravenhage(NL)**(54) **Pulley arrangement for a transmission provided with a flexible transmission element.**

(57) Pulley arrangement for a C.V.T., in which the pulley bearing surfaces (12, 14) are made of high grade steel and fixed to the pulleys (4, 6) by means of a layer of a suitable adhesive (16).

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The invention relates to a pulley arrangement according to the preamble of claim 1. Such arrangements are generally known per se.

In order to limit the wear caused as a result of the high stresses on such pulleys, and also in order to increase their service life, such pulleys are made of a high-grade high-alloy steel, which considerably increases the cost of a transmission provided with such pulleys. Practice has shown that, during use and under certain operating conditions the problem arises that such transmissions produce a disturbing noise depending on, inter alia, load, transmission ratio and speed of rotation, which constitutes a problem in particular if they are in the form of a continuously variable transmission for use in motor vehicles.

The object of the invention is to propose a design of such a pulley arrangement which results in a considerably cheaper construction. This object is achieved by the measures described in the characterizing part of the main claim.

It was surprisingly found that these measures not only reduce the cost considerably, but also considerably reduce the level of the noise caused during operation. It is felt that the explanation for this unexpected effect must be sought in the damping action of the adhesive layer present between pulley bearing surface and pulley.

Besides, the fact that only the bearing surfaces of the pulley system need be made from a high-grade steel means that it is possible, depending on the manufacturing process for this system (forging, casting, sintering etc.) to select a material appropriate to this process which would otherwise, for cost reasons never have been considered.

Preferred embodiments of the invention are indicated in claims 2 - 8.

The invention is explained with reference to the drawing. The single figure thereof shows a practical embodiment of a pulley system according to the invention.

In the figure, reference numeral 2 indicates a shaft of a continuously variable transmission, and reference numeral 4 a pulley made integral therewith. A second pulley 6 is integral with the hub 8 and can be fitted on said shaft so that it slides in the direction of the arrows 10.

The pulleys are destined to co-operate with a flexible transmission element which can be a chain with hinge pins interconnected by links, or a belt comprising transverse elements fitted on a metal support.

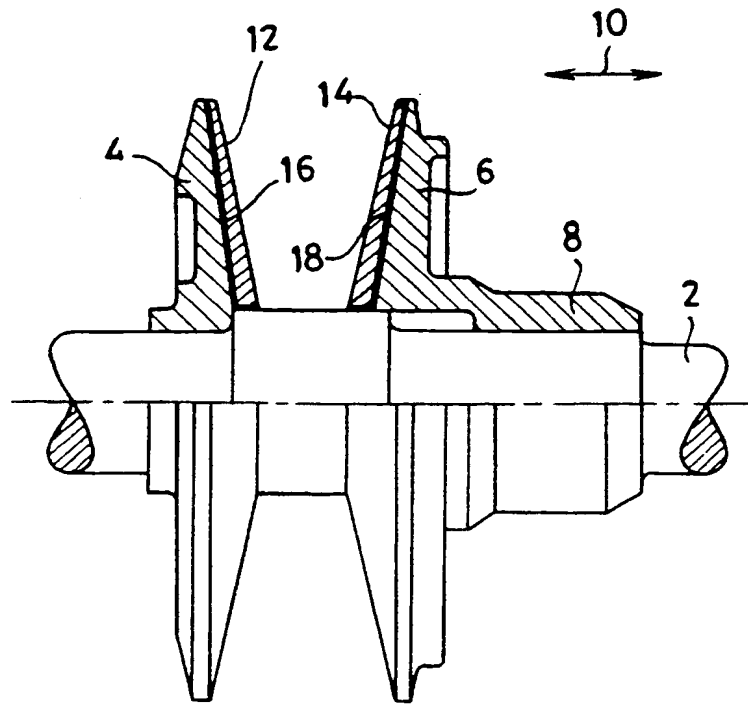
According to the invention, the pulley surfaces co-operating with the power-transmitting elements of the transmission element (pins, transverse elements) are formed by thin-walled bearing surfaces made from a high-alloy steel, for the pulley 4 indicated by 12, and for the pulley 6 indicated by

14. The two bearing surfaces are fixed to said pulleys by means of a suitable adhesive layer, for the pulley 4 indicated by 16, and for the pulley 6 indicated by 18.

A suitable adhesive is a polyurethane adhesive. The base material which has been found suitable for the shaft 2 with the pulley 4 and the pulley 6 with the hub 8 is carbon steel and cast iron respectively, while for the bearing surface a through-hardening tool steel can be used.

## Claims

1. Pulley arrangement for a variable transmission provided with a flexible transmission element, in particular a continuously variable transmission, comprising two metal pulleys (4, 6) supported by a shaft (2), characterized in that in at least one of the pulleys (4) the surface thereof co-operating with the transmission element is covered with a pulley bearing surface (12) made of high-grade steel and fixed thereto by means of a suitable adhesive (16).
2. Pulley arrangement according to claim 1, characterized in that both of the pulleys (4, 6) the surface co-operating with the transmission element is covered with a pulley bearing surface (12, 14) made of high-grade steel and fixed thereto by means of a suitable adhesive (16, 18).
3. Pulley arrangement according to claim 1 or 2, characterized in that the adhesive (16, 18) is a polyurethane adhesive.
4. Pulley arrangement according to claims 1 - 3, characterized in that the pulley bearing surface (12, 14) is made of through-hardening tool steel.
5. Pulley arrangement according to claims 1 - 4, characterized in that the pulleys (4, 6) are made of carbon steel.
6. Pulley arrangement according to claims 1 - 4, characterized in that the pulleys (4, 6) are made of cast iron.
7. Pulley arrangement according to claims 1 - 4, characterized in that the pulleys (4, 6) are made of sintered metal.
8. Pulley arrangement according to claims 1 - 7, characterized in that one of the pulleys (4) is integral with a shaft (2) of the transmission, while the other pulley (6) is fitted on said shaft such that it can slide in the axial direction (10).





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# EUROPEAN SEARCH REPORT

Application Number

EP 91 20 1284

## DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-3 142 997 (RAMPE) * Columns 1-4; figures 1-3 * -----	1,2,7	F 16 H 55/36 F 16 H 55/56
A	US-A-2 413 817 (FIRTH) * Column 2; figure 4 * -----	1	
A	PATENT ABSTRACTS OF JAPAN, vol. 10, no. 114 (M-473)[2171], 26th April 1986; & JP-A-60 241 560 (USUI KOKUSAI SANGYO K.K.) 30-11-1985 -----	1	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.5)  F 16 H 55/00
Place of search	Date of completion of search	Examiner	
The Hague	05 September 91	ORTHLIEB CH.E.	
CATEGORY OF CITED DOCUMENTS			
X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention		E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons ----- &: member of the same patent family, corresponding document	

